

Formula	Formula (cont)	Note
Price of Longer Maturity Coupon Paying Bond	$P[1] \cdot (1 + \text{EAR})^T = P[T]$	Note: Spot Rates = Flat Term Rate. And Equal to YTM if the rates are flat. If not, YTM is found using the formula to your left.
$P = c/r \cdot (1 - 1/(1+r)^t) + \text{ParValue}/(1+r)^t$	Converting Monthly APR to Semiannual $(1 + \text{APR}/12)^6 - 1$	
Price of Zero Coupon Bond	Calculating for Spot Rates using Price Formula	
$P = \text{ParValue}/(1+r)^t$	Price = $\text{ParValue}/(1+r)$ then solve for r	
Price of Short Maturity Coupon Paying Bond		
$P = \text{Coupon}/(1+r)^t + (\text{ParValue} + \text{Coupon})/(1+r)^t$		
Nominal Growth rate of Cash Flows		
$i = (1 + \text{GrowthRate}) \cdot (1 + \text{InflationRate}) - 1$		
Real Return Adjusted for Inflation		
$r = (1+i)/(1+\text{Inflation})$		
Present Value of Cash Flows		
$PV = \text{Cash} \cdot ((1+i)^{t-1}/(1+\text{DiscountRate})^{t-1} + (1+i)^t/(1+\text{DiscountRate})^t + \dots)$		
Computing YTM		
Rates = Flat; Rates = YTM.		
Rates $\neq$ Flat; Solve for Price, Swap Rates for Y and solve for Y		
Discount Factors (D) for Zero Coupon Bonds		
Price/100		
Discount Factor (D) for Coupon Paying Bonds		
Price = $C \cdot D[1] + (\text{ParValue} + C)D[2]$		
Calculation for Spot Rates Using Discount Factor		
$r = (1/D)^T - 1$		
For semiannual multiply answer by 2		
Calculating Price with Discount Rates		
$P = C \cdot D[1] + C \cdot D[2] + (\text{ParValue} + C)D[3]$		
For semiannual C/2		
Macaulay Definition		
$D = (1+r)/r - \{[(1+r) + T(C-R)] / (C[(1+r)^T - 1] + r)\}$		
Where R = Flat Rate Or YTM.		
When Semiannual r/2 and c/2, divide final answer by 2		
Modified Duration		
$D^* = D/(1+r)$		
Present Value of Liabilities		
	Constructing an Arbitrage	
	e.g:	
	Year 1 $\Rightarrow 100x[1] + 5x[2] = 7 \{x[3]\}$	
	Year 2 $\Rightarrow 105x[2] = 107 \{x[3]\}$	
	Solve for x[1] and x[2]	
	Computing Realized Returns assuming Dividend Reinvesting	
	e.g:	
	Invest \$1000, 1000/Share Price = # of Shares	
	# of Shares + [# of Shares * Dividend Pay-out]/NextSharePrice	
	Repeat til end of Periods, compute the realized returns	
	Monthly Payment Questions	
	Owed Amount = $c/r \cdot [1 - 1/(1+r)^T]$	
	Solve for C, Make sure T is in the right format (Monthly Payments, Yearly, Daily)	
	What is your return if term structure remains flat and you hold for X years?	
	TSR = Term Structure Rate	
	$(1+r)^T = R/100$	
	$R = C \cdot (1 + \text{TSR})^{T-1} + C \cdot (1 + \text{TSR})^{T-2} + \dots + C \cdot (1 + \text{TSR})^1 + (\text{ParValue} + C)$	
	Plug in R to first equation then solve for small r	
	Simple Trading Model	

Liabilities * $1/(1+r)^T$

Compute Realized Returns

$(P[0] - P[-1]) / P[-1]$

Computing Expected Returns

$E(R) = (\text{Probability} * \text{Return} + \dots)$

Computing Standard Deviation

$Sd(R) = \text{Sqrt}(\text{Probability} * (\text{Return} - E(R))^2 + \dots)$

Effective Annual Rate (EAR)

Expected Value of Stock

$E(V) = P[h]*V[h] + P[l]*V[l]$

Ask price so Market Maker breaks even

A =

$(P[u]*P[l]*V[l] + P[h]*V[h]) / (P[u]*P[l] + P[h])$

Bid price so Market Maker breaks even

B =

$(P[l]*V[l] + P[u]*P[h]*V[h]) / (P[l] + P[u]*P[h])$

Bid-Ask Spread

$s = A - B$



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